

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KIYOHICO TAKEMOTO,
SHUICHI YAMAGUCHI, AKIO YAMAMORI
and YUKIYOSHI ICYU

Appeal No. 1997-1335
Application 08/201,023

ON BRIEF

Before THOMAS, BARRETT and HECKER, Administrative Patent
Judges.

HECKER, Administrative Patent Judge.

DECISION ON APPEAL

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Application No. 08/201,023

This is a decision on appeal from the final rejection of claims 1 and 5, all of the claims pending in the application.

The invention relates to a nozzle plate for an ink-jet recorder, wherein the surface of the nozzle plate is coated with a water-repellent coating. The coating surrounds each nozzle hole except for a predetermined area immediately adjacent each hole.

Representative independent claim 1 is reproduced as follows:

1. A nozzle plate having one or more nozzle holes for ejecting ink droplets, wherein a water-repellent coating is formed on a surface of said nozzle plate surrounding said nozzle holes, so as to leave an uncoated portion of said nozzle plate surface surrounding said nozzle holes, said uncoated portion having an outer diameter larger than a diameter of said nozzle holes by no greater than approximately 140% of the diameter of said nozzle holes.

The references relied on by the Examiner are as follows:

Fujimura et al. (Fujimara)	4,751,532	Jun. 14, 1988
Miura et al. (Miura)	4,801,955	Jan. 31, 1989

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Claims 1 and 5 stand rejected under 35 U.S.C. § 103 as being unpatentable over Miura in view of Fujimura.

Rather than repeat the arguments of Appellants or the Examiner, we make reference to the brief and the answer for the details thereof.

OPINION

After a careful review of the evidence before us, we agree with the Examiner that claims 1 and 5 are properly rejected under 35 U.S.C. § 103.

The Examiner reasons that Miura teaches the claimed nozzle plate in Figure 11B, wherein element 52 is the ink repelling layer surrounding the nozzle holes. As shown in Figure 11B, an uncoated area exists around each nozzle hole. Since Miura does not specify the relative size of the uncoated area, the Examiner has turned to Fujimura. Fujimura teaches the benefits of having an uncoated area around nozzle slits,

equivalent to nozzle holes. Fujimura indicates that the uncoated area "can be easily set to form any desired meniscus" (column 4, lines 65-68). (Answer-pages 2 and 3.) Thus, the Examiner states:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the nozzle plate of Miura, et al. with the amount of uncoated area of Fujimura, et al. because the amount of uncoated area of Fujimura, et al. can be optimized to produce any desire[sic desired] meniscus as desired by Miura, et al. in the art. (Answer-page 3.)

Appellants do not dispute the use of a water-repellent coating with an uncoated area surrounding nozzle holes. Appellants argue that the references do not disclose or suggest the relative size of the uncoated area to the nozzle hole size being the claimed 140%. Appellants calculate the relative size of Miura's Figure 11B embodiment based upon Miura's Figure 10 embodiment (brief-page 6). We find these calculations to be unconvincing since they amount to mere conjecture, without any evidence to indicate a size relationship between these figures.

Appellants acknowledge Fujimura teaches a predetermined distance (area) from the edge of a nozzle hole

which is left not coated by the water-repellent material (brief-page 7). However, Appellants argue, all of Fujimura's **examples** far exceed the 140% relationship claimed by Appellants. We are unconvinced that Fujimura's **examples** limit the extent to which the uncoated area may exceed the size of the nozzle opening. This is especially so since Fujimura states that the size can be **set** to form any desired meniscus size.

Fujimura recognizes that nozzle plate geometries may differ dependent upon the particular environment in which they are used. Nozzle plates may be subjected to thermal energy in conjunction with an electrostatic field either simultaneously or in a timed relationship (column 5, lines 57-68). The electric (thermal) energy may be pulsed in a variety of ways to change the ink's physical properties, such as viscosity, surface tension, electrical conductivity and the like (column 5, lines 48-50). Example 3-1, with a slit size of 100 Fm, produced an ink dot of 150 Fm with a printing time of 0.4 msec (column 9, lines 9,10, 33 and 34); while example 3-2, with a

slit size of 5 Fm, produced an ink dot of 160 Fm with a printing time of 0.5 msec (column 9, lines 53-61). In Miura, Figure 11B produces a relatively large meniscus (column 9, lines 27 and 28), while Figure 11C produces a relatively small meniscus which would require a lower threshold voltage for discharging the ink (column 9, lines 37-40). Thus, we see that nozzle plates are subjected to a large variety of applications. Appellants envision a piezo transducer drive system (brief-page 4), Miura envisions an electric field and air pressure system (column 1, lines 14 and 15), while Fujimura envisions a thermal energy and electric field system (abstract). Appellants' claims are not limited to any particular system or operational constraints. Each system may use a variety of inks having different physical characteristics. Each system may require different ink dot sizes, depending on desired print quality and printing speed.

Accordingly, we agree with the Examiner that optimization of the nozzle size and **predetermined distance** of the water-repellent coating from the nozzle hole edge, would have been obvious once the particular nozzle plate application

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were determined. Determining the optimal values of result effective variables would have been obvious and ordinarily within the skill of the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Appellants argue the standard for patentability is not whether it would have been "obvious to try" the claimed invention, and cite *In re Fine* (brief-page 9). We do not find this to be an "obvious to try" situation. Miura and Fujimura both **teach** trying various amounts of uncoated areas. We find this to be a situation of "obvious to optimize", based on result effective variables.

Looking at the scope of claim 1, we note that the claimed size is "no greater than **approximately** 140%" (emphasis added). We also note that claim 5 recites "no greater than **approximately** 120% (emphasis added). Since there is a difference of 20% between the two claims, it would be logical to project the high end of claim 1 to be **about** 160%. On the other hand, since the lower limit is recited in claim 1 as merely "larger than a diameter of said nozzle holes", we reason the lower limit could be as low as 100.001%, probably

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within manufacturing tolerances. Thus, the Examiner's statement that Miura's Figure 11C, with a 100% ratio, could meet the claim requirements (answer-page 4), is especially true when considering manufacturing tolerances.

In view of the foregoing, the decision of the Examiner rejecting claims 1 and 5 under 35 U.S.C. § 103 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

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AFFIRMED

	James D. Thomas)	
	Administrative Patent Judge)	
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PATENT			
	Lee E. Barrett)	
	Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
	Stuart N. Hecker)	
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SH/dm

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